UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF NEW YORK

NETWORK-1 TECHNOLOGIES, INC., Plaintiff, - against - GOOGLE, INC., and YOUTUBE, LLC, Defendants.	14 Civ. 2396 (PGG)

NETWORK-1 TECHNOLOGIES, INC.'S OPENING CLAIM CONSTRUCTION BRIEF

Table Of Contents

Table Of Authorities

CASES

STATUTES

I. INTRODUCTION

This case presents several terms and phrases from the claims of the patents-in-suit for the Court to construe. This requires that the Court determine the ordinary and customary meaning of those terms to a person of ordinary skill in the relevant art at the time of the effective filing date of the patent application. This understanding is informed by both the context of the particular claim(s) where the term appears as well as the patent specification.

Plaintiff Network-1 Technologies, Inc. ("Network-1") proposes constructions that fit these basic principles and the many Federal Circuit decisions implementing and elucidating them. Defendants (collectively, "Google") offer constructions that fail to accurately reflect the ordinary meaning of these claim terms to persons skilled in the art in an effort to advance invalidity or non-infringement positions. Additionally, for some terms, Google argues that they are indefinite. This assertion of indefiniteness is a species of patent invalidity under 35 U.S.C. § 112, paragraph 2. Google bears a heavy burden under the most recent decisions from the Supreme Court of showing, by clear and convincing evidence, that the claims fail to inform persons skilled in the art of the scope of the invention with reasonable certainty. Google cannot meet that burden here.

Below we present first, a brief background of the patents-in-suit and the basic concepts involved. Next, we provide an overview of some of the key legal principles of claim construction as set forth by the Federal Circuit. Finally, we address the disputed claim construction issues in turn, demonstrating that the constructions offered by Network-1 conform to the standards set by the Federal Circuit, while the constructions offered by Google do not.

II. BACKGROUND

Professor Ingemar J. Cox, a Professor in the Department of Computer Science at the University College of London and at the University of Copenhagen is the inventor of the four

patents-in-suit.[1] Dr. Cox is the author of over 200 academic papers in the fields of information retrieval, digital watermarking, and video search identification techniques. Dr. Cox has served as Head of the Future Media Group and Director of Research in the Computer Science Department at University College London, a visiting professor at the Danish Technical University, distinguished visiting scholar at Pennsylvania State University, fellow of Computer Science at the NEC Research Institute, and principal investigator at the Robotics Principles Department of AT&T Bell Laboratories. Dr. Cox holds a Ph.D. from Oxford University in engineering science and a Bachelors of Science in electronics and computer science from University College London.

In September, 2000, Dr. Cox filed a provisional patent application that ultimately led to the four patents-in-suit. The patents describe systems and methods for identifying media content. '988 Patent, Col. 5:39-55 (§ 4.0).[2]

For example, the patents describe systems in which a database of reference works (such as known recordings of popular songs, or known videos of television programs) can be maintained. Col. 8:5-59 (§ 4.2.1.1.2). Each of these reference works can then be represented by a compact electronic representation – an electronic fingerprint of sorts. Col. 7:15-8:2 (§ 4.2.1.1.1).

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[1] Exh. 1, US. Patent Nos. 8,010,988 ("'988 patent"); Exh. 2, 8,250,237 ("'237 patent"); Exh. 3, 8,640,179 ("'179 patent"); Exh. 4, 8,656,441 ("'441 patent"). All references to "Exh." in this brief are exhibits appended to the Declaration of Dorian S. Berger in Support of Network-1 Technologies Inc.'s Opening Claim Construction Brief.

[2] All four of the patents-in-suit share the same patent specification, with minor modifications. For ease, citations to the specification throughout this brief will be to the '988 patent specification, though the same material is present in all four of the patents. The citations reference the section numbers used in the specification to facilitate ease of cross-reference. There are, however, slight differences in the specifications. The "Summary of the Invention" section of the specifications varies somewhat, and there is some additional discussion in the later '237, '179, and '441 patents of certain references that were incorporated by reference in all of the specifications.

The patents also use terms like feature vector to describe such fingerprints. *Id.* The patents teach that in addition to these fingerprints, the database could also store information about actions to be performed that are connected or associated with each reference work. Col. 8:5-59 (§ 4.2.1.1.2); Col. 23:35-51. For example, each time the video of a particular television program is shown to a viewer, additional information, like an advertisement, could be displayed to the viewer. *Id.*

The patents contemplate a system where additional, unknown content needs to be compared (or "queried") to the reference works to see if it matches any of the referenced works. *See, e.g.,* Col. 6:30-7:10 (§ 4.2.1.1). For example, in an internet video system, the operator might wish to compare each new video uploaded by a user to the library of known references to see if it matches any of those known references. Such comparisons could help, for example, to identify duplicative videos, to limit copyright infringement by users of the system, and/or to facilitate better identification and description of videos on the system.

The patents teach that the new work (the unknown video in this example) can be processed to create a compact electronic representation – a fingerprint – of the new unknown video. Col. 6:60-65 (§ 4.2.1.1). This fingerprint can then be compared to the database of fingerprints of the known references. Col. 6:66-7:3. To make such comparisons, the patents note that comparing the fingerprint for the new video to the fingerprints from all of the known references could be time consuming. Col. 8:60-9:55 (§ 4.2.1.1.3). This difficulty stems from two causes: first, the database of known references could be very large, and second, each comparison of two "fingerprints" can be computationally intensive by itself. The comparisons can be computationally intensive for two reasons: 1) the need to find close matches that are not necessarily identical, and 2) the need to compare potentially "high dimensional" representations.

Comparisons need to be looking not for exact matches, but for close matches because one wants the system to identify two pieces of content as matching even though they have small or subtle differences between them. The patents recognize that one problem to be addressed is that an incoming work may have noise or distortions in it. Col. 9:1-3 (§ 4.2.1.1.3). Thus it teaches using comparisons that look for close, but not necessarily exact matches. Col. 8:60-9:55 (§ 4.2.1.1.3). For example, an incoming video that contains a portion of a television program might have been recorded from a broadcast television signal that contains some static or "noise" in the signal that creates distortions, or it might have been recorded by someone using a video camera pointed at a television on which the program was being displayed, or it might contain a clip that was only a portion of the television program (like a five minute clip). In each of these cases, since the video contains the reference television program (or a part of it), designers would want the system to identify the uploaded video as a match to the reference, even though it was not perfectly identical. To determine whether the uploaded video is a match to the reference, the comparisons would need to determine not just that the two fingerprints are different, but also some measure of how different they are. Designers can decide how different two things have to be before they are not identified as a match. Col. 9:39-9:55 (§ 4.2.1.1.3).

The individual comparisons also could be complicated by the high dimensionality of the "fingerprints" (the compact electronic representations of the works). The patent makes reference to this issue of a "high dimensional feature space." Col. 9:23-24. Fingerprints need enough data in them to be sufficiently complex that each fingerprint represents the underlying content (the primary work) with a low likelihood of two different references having the same fingerprint. *See* Karypis Decl., ¶ 23. To achieve sufficient complexity that the fingerprint actually represents the primary work (the original audio or video), it is often necessary to use multiple dimensions to represent the work. This might be achieved by capturing many different types of information

about the work. In the context of a song, one might collect the tempo (beats per minute), the key, the range from the highest note to the lowest in the song, the number of notes in the song, the total duration of the song, etc. Each of these can be considered another "dimension" of the data. Karypis Decl., ¶ 34. Similarly one could capture snapshots of particular values (for example the pitch and intensity values) at multiple times during the song. Then this data could be used as the fingerprint for comparison to the database of reference works (with similar fingerprints). *Id.* ¶¶ 29-32.

If the uploaded work matches one of the reference works, then the system can recognize that the same action that is associated with the reference work can also be associated with the uploaded work. Col. 9:57-10:40 (§ 4.2.1.1.4). For example, if the system provided that an advertisement was to be shown with the reference work, the advertisement can also be shown with the now-identified uploaded work. The patents describe an example in which the incoming work is an advertisement for Ford Motor Company, and the associated action may be to direct the viewer to a local Ford dealership. Col. 24:23-27.

The patent specification contains a flow diagram that shows the basic process described above in Figure 1, reproduced below:

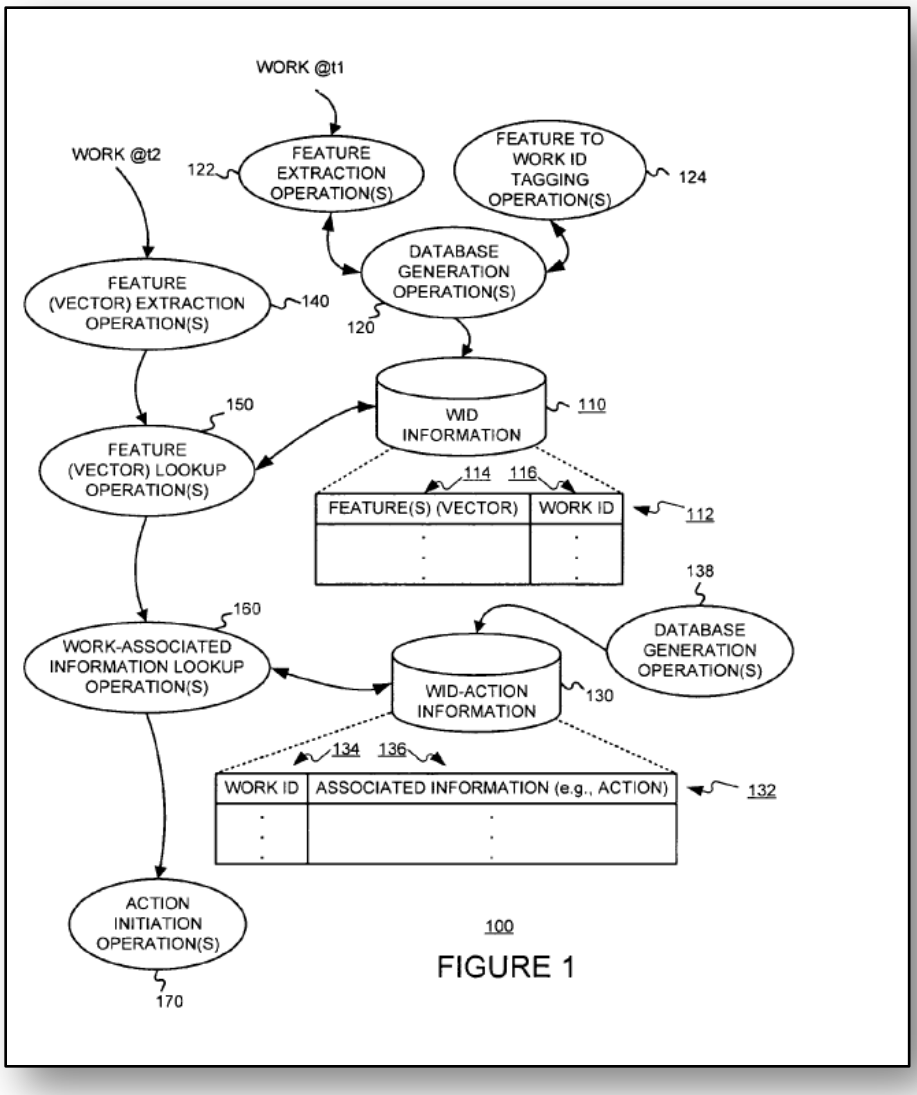

FIGURE 1

III. CLAIM CONSTRUCTION PRINCIPLES

A) Claim Interpretation Focuses On The Meaning Of Terms To Persons Of Ordinary Skill In The Art

Patent Claim interpretation is a question of law, often with the need for subsidiary fact-finding. *See Teva Pharmaceuticals USA, Inc. v. Sandoz, Inc.*, 547 U.S. _____, 135 S.Ct. 831 ___ (2015) (slip. op. at 6-7). The Federal Circuit explains that "[t]he inquiry into how a person of ordinary skill in the art understands a claim term provides an objective baseline from which to begin claim interpretation." *Phillips v. AWH Corp.*, 415 F.3d 1303, 1313 (Fed. Cir. 2005) (*en banc*). The Court went on to explain that "the person of ordinary skill in the art is deemed to read the claim term not only in the context of the particular claim in which the disputed term

appears, but in the context of the entire patent, including the specification." *Id.* Thus, the Court's task in claim construction is to determine how a person of skill in the art at the time of the patent (*i.e.*, the priority date of the application – in this case September 2000) would interpret a disputed term, having considered the patent specification and prosecution history: "It is the person of ordinary skill in the field of the invention through whose eyes the claims are construed. Such person is deemed to read the words used in the patent documents with an understanding of their meaning in the field, and to have knowledge of any special meaning and usage in the field. The inventor's words that are used to describe the invention – the inventor's lexicography – must be understood and interpreted by the court as they would be understood and interpreted by a person in that field of technology. Thus the court starts the decision-making process by reviewing the same resources as would that person, *viz.*, the patent specification and the prosecution history." *id.* (quoting *Multiform Desiccants, Inc. v. Medzam, Ltd.*, 133 F.3d 1473, 1477 (Fed. Cir. 1998)).

The patent specification and prosecution history, collectively considered "intrinsic evidence", are the first source for claim construction and its importance has been emphasized by the Federal Circuit. *Phillips*, 415 F.3d at 1317. Courts also may also, when necessary, consider extrinsic evidence, which "consists of all evidence external to the patent and prosecution history, including expert and inventor testimony, dictionaries, and learned treatises." *Id*. (internal citations omitted).

B) Claims Are Definite Unless They Fail To Inform Those Skilled In The Art Of The Scope Of The Invention With Reasonable Certainty

In addition to the interpretation issues presented by some terms, Google asserts that some of the claims are invalid for indefiniteness. The Supreme Court recently held that the claims of a patent are indefinite under 35 U.S.C. § 112 only if the "claims, read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those

skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc*., 134 S. Ct. 2120, 2129 (2014). The definiteness requirement "mandates clarity, while recognizing that absolute precision is unattainable." *Id.* at 2129. Definiteness is to be evaluated from the perspective of someone skilled in the relevant art and, in assessing definiteness, claims are to be read in light of the patent's specification and prosecution history. *Nautilus,* 134 S. Ct. at 2128. Defendants bear the burden of proving their indefiniteness defense by clear and convincing evidence. *Wellman, Inc. v. Eastman Chemical Co*., 642 F.3d 1355, 1366 (Fed. Cir. 2011).

IV. AGREED CONSTRUCTIONS

The parties have reached agreement on the construction of the following claim terms:

Claim Term	Construction
"compact electronic representation"	"Extracted features, or information derived from extracted features."
"extracted features"	"Electronic data derived from a work itself, as opposed to from information added or appended to the work."
"extracting features"	"Deriving electronic data from a work itself, as opposed to from information added or appended to the work."
"feature vector"	"Extracted features, or information derived from extracted features."
"sublinear" [search]	"A search whose execution time scales with a less than linear relationship to the size of the data set to be searched, assuming computing power is held constant."

V. DISPUTED CONSTRUCTIONS

The following are the claim terms as to which the parties offer differing constructions, requiring the Court's interpretation.

A) "neighbor" "near neighbor"[3]

Plaintiff's Proposed Construction	Defendants' Proposed Construction
"A close, but not necessarily exact or the closest, match of a feature vector, compact electronic representation, or set of extracted	"A close, but not necessarily exact or the closest, match of one feature vector, compact electronic representation, or set of

[3] Cited in '988 patent: **15**, 17, 31, 32, 51, 52; '237 patent: **25**, 26, 27; '179 patent: **13**, **24**, 34, 35; '441 patent: **1**, 2, 3, 9, 11, 22, **23**, **25**, **26** (bold indicates an independent claim).

features to another, that has a distance or difference that falls within a defined threshold of a query."	extracted features to another."

(1) Network-1's Definition Comes Directly From The Patent Specification.

"There is a heavy presumption that claim terms are to be given their ordinary and customary meaning." *Aventis Pharm. Inc. v. Amino Chemicals Ltd.*, 715 F.3d 1363, 1373 (Fed. Cir. 2013). The terms "neighbor" and "near neighbor" are terms of art in the area of the patents-in-suit that are used interchangeably in the patents.[4] The parties agree on most of the construction: "A close, but not necessarily exact or the closest, match of a feature vector, compact electronic representation, or set of extracted features to another." Defendants, however, ask the Court to exclude a critical portion of the definition of these terms as they are used in the art and as they are used in the patents-in-suit. Network-1 offers a definition that includes this critical additional portion: "that has a distance or difference that falls within a defined threshold of a query." Network-1's correct definition clarifies what constitutes a "close" match. As explained below, the patents make clear that a reference that is outside a threshold distance or difference from the query cannot be called a match.

The patents' specification describes "neighbor" and "near neighbor" searches as determining a match (or lack of match) based on some threshold. They use the word threshold at least seven times in the specification to describe how matches are identified. *See e.g.*, '988 patent 7:1-3, 14:25-27 ("If a match, or a match within a predetermined *threshold* is determined, then the associated work identifier is read."); *Id*. 9:9-13, 21:18-22 ("A *threshold* can be established, usually based on the required false positive and false negative rates, such that if the correlation output exceeds this *threshold*, then the extracted and known vectors are said to match."); *Id*. 22:20-22 ("if the distance between the query and the nearest neighbor exceeds a *threshold*, then they are considered not to match."). In general, the specification teaches that one

[4] The parties agree that the terms "neighbor" and "near neighbor" should have the same construction.

use of the invention is to identify unknown electronic works (such as music or video files). Col. 7:17-20 (§ 4.2.1.1.1). The specification explains that extracted features or feature vectors can be compared to known vectors in a database and that "[i]f the extracted vector 'matches' a known vector in the content identification database, then the work has been identified." Col. 9:39-41. The specification goes on to explain the risk of a match being incorrect – a false positive error. *Id.* This false positive error can be reduced at the expense of an increased false negative error. Col. 9:43-46. Thus, the specification recognizes that the acceptable rate of false positives and false negatives can be tuned by adjusting the threshold values. Col. 9:9-13.

The claims of the patents-in-suit make clear that they entail identifying electronic works by finding matches through searches for a neighbor or a near neighbor. Both sides agree that these terms should be construed to have the same meaning. As described in the specification, to know that a neighbor is a match, it must be within a threshold distance or difference of the query (the unknown work to be identified). A reference that is outside a threshold distance from the query cannot be called a match.

Google suggested during the meet and confer process that it disagreed with Network-1's proposed construction due to the presence of dependent claims like Claim 16 of the '988 patent. The patent claims identify a "fixed radius" as something within the category of a "neighbor" in, for example, '988 patent dependent claim 16 (identification is based on a non-exhaustive search identifying a neighbor within a fixed radius). Although "neighbor" and "near neighbor" contemplate the use of some distance or difference threshold, that threshold need not be a fixed radius as Google incorrectly suggests. While a search algorithm can be designed to utilize a fixed radius threshold, it could also be designed so that the threshold is variable for each query. This variability allows for the difference threshold to be adjusted, for example, based on the characteristics of the query (the unknown work to be identified). As just one example, in the

context of analyzing unknown audio or video samples, an algorithm could utilize different thresholds to define a neighbor or near neighbor depending upon the amount of noise present in the query sample. Karypis Decl., ¶¶ 33, 42-44.

(2) Defendants' Proposed Construction Is Inconsistent With The Preferred Embodiment And The Dependant Claims.

Defendants' proposed construction of "neighbor" and "near neighbor" search omits the phrase, "that has a distance or difference that falls within a defined threshold of a query." As discussed above, a preferred embodiment of the patents-in-suit involves searching for a neighbor or a near neighbor to identify a work. *See, e.g.,* Col. 8:60-9:55. Such identification requires the use of a distance or difference threshold to determine if a comparison yields a match or not. *See, e.g.* Col. 7:1-3; 9:9-13. Without this additional clarification of the definition, Defendants' proposed construction would yield a claim that is inconsistent with the preferred embodiment, and therefore must be rejected. *See Epos Technologies Ltd. v. Pegasus Technologies*, 766 F. 3d 1338, 1347 (Fed. Cir. 2014) (reversing district court claim construction which did not encompass preferred embodiment: "[A] claim construction that excludes a preferred embodiment ... is rarely, if ever correct and would require highly persuasive evidentiary support.") (quoting *Anchor Wall Sys., Inc. v. Rockwood Retaining Walls, Inc.,* 340 F.3d 1298, 1308 (Fed.Cir.2003)) (citations omitted). Without a threshold, every record in the database could, theoretically, be considered a "neighbor" / "near neighbor." If this were the case, every search would, by definition, identify a "neighbor" / "near neighbor," but without any connection to actually matching the primary works as claimed in the patents. Google's proposed construction fails to preserve the patents' internal coherence and thus should be rejected. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 390 (1996) (claims should be construed to "preserve the patent's internal coherence").

Google's proposed construction also conflicts with the fact that the patents and claims

contemplate that for some searches, no match will be identified. *See, e.g.,* Col. 9:53-55 ("there is the case where the observed work is not present in the database."). The use of thresholds allows the system to return a "no match" result as the specification contemplates is possible. If there is no threshold so that any record in the database could be a neighbor, the system would always return some match, even if far from the query. Claim 24 of the '179 patent and claims 23 and 26 of the '441 patent expressly claim a search where no match is identified. Claim 24 of the '179 patent, for example, recites using a "non-exhaustive neighbor search" and, based on that search, determining that a work "is not identified." Google's proposed construction conflicts with this usage in the claims. The Federal Circuit instructs that "the usage of a term in one claim can often illuminate the meaning of the same term in other claims. *Phillips*, 415 F.3d at 1314. Here, the "neighbor" terms are used in claims that recite performing searches where no match is identified. Google's proposed definition conflicts with these claims, confirming that Network-1's construction is correct.

(3) Extrinsic Evidence Confirms Network-1's Construction.

Network-1's proposed construction is confirmed by the usage and understanding of persons of ordinary skill in the art at the time of the invention. Professor Karypis confirms that, at the time of the invention, "neighbor" and "near neighbor" were terms of art that were well known in the art. Karypis Decl., ¶¶ 48-53. Thus, he explains, one skilled in the art would have understood the terms "neighbor" and "near neighbor" in the context of searching methodologies to mean locating "a close, but not necessarily exact or the closest, match" that has a "distance or difference that falls within a defined threshold of a query." Karypis Decl., ¶ 41.

This understanding is confirmed by usages in the literature. For example, even one of Google's co-founders recognized (in an article contemporaneous with the time of the patents-in-suit and cited on the face of three of them) that a neighbor or near neighbor is defined, in part, by a distance or difference threshold. Specifically, Sergey Brin wrote, "[f]inding *near neighbors* in

a metric space refers to selecting the elements of a data set (a finite subset of the space) which *are within a certain distance of a given point*." Exh. 5, Brin, *Near Neighbor Search in Large Metric Spaces*, Proceedings of the 21st VLDB Conference, Zurich, Switzerland, 1995 at 1 (emphasis added). Brin further confirms that a "standard definition" of "near neighbors" searching includes a threshold "r" (in other words a threshold distance or difference as in Network-1's construction).[5] *Id.* at 3; *see also* Karypis Decl., ¶ 49.

Other references cited on the face of the patents-in-suit similarly describe "neighbor" and "near neighbor" searches as requiring a threshold value. The threshold value is then used to determine if the search will return a match that falls within the threshold range. *See e.g.*, Exh. 6, U.S. Patent No. 6,446,068 to Kortge at 1:24-26 (describing near neighbor search as having some distance metric that is used to determine if an item is a "near neighbor." "Such a search is often called a 'near neighbor' search, in that we are seeking stored data items which are nearby the query point, *in terms of some distance metric*.") (emphasis added). All of these references further confirm that Network-1's construction correctly reflects the usage of these terms in the art.

B) "non-exhaustive search"[6]

Plaintiff's Proposed Construction	Defendants' Proposed Construction
"A search using an algorithm designed to locate a match without requiring the query to be compared to every record in the reference	Indefinite. Alternatively, "A search that is not

[5] In the paper, Mr. Brin provided "the standard definition[]" of "near neighbors." "Given a metric space (X,d), a data set Y ⊆ X, a query point x ∈ X, and a range r ∈ R, **the near neighbors** of x are the set of points y ∈ Y, such that d(x,y) ≤ r." *Id*. at 3. (emphasis added). This article is cited on the face of three of the four patents in suit. ('237, '441, and '179). Others at Google likewise have adopted a similar definition since. *See, e.g.,* Exh. 7, Dror Aiger, from Google, Inc., et al., "Reporting Neighbors in High-Dimensional Euclidean Space", SIAM Journal Of computing, vol. 43 (2014), pp. 1239-1511, at 4 (available at http://static.googleusercontent.com/media/research.google.com/en/us/pubs/archive/42457.pdf). ("In this paper we present two simple randomized algorithms for reporting all near neighbors reporting problem. That is, given an input set P of n points in R^d, we wish to report all points of P at (Euclidean) distance at most given value r.") (See Karypis Decl., ¶ 50.).

[6] Cited in '988 patent: **15**, 17, 31, 32, 51, 52. '237 patent: **25**, 26, 27 (bold indicated independent claim).

data set being searched until a match is identified."	guaranteed to find a match, if one exists."

"Non-exhaustive search" is a term of art understood by skilled artisans in the field. *See* Karypis Decl., ¶ 55. The difference between a search being exhaustive or non-exhaustive is not whether a match is found (as Google proposes), but rather the ability to limit the number of comparisons of the query against the reference data set to be searched – that is, whether the algorithm exhaustively compares to every record in the data set or not. *See* Karypis Decl., ¶¶ 56-57. The specification explains this concept in some detail at, for example, columns 21-22 of the '988 patent.

Defendants assert that this claim term renders the asserted claims invalid for indefiniteness. To prove indefiniteness, Defendants must establish by clear and convincing evidence that one of ordinary skill in the art would not find the term "non-exhaustive search" to be understandable with reasonable certainty. As discussed in detail below, Professor Karypis explains that "non-exhaustive search" is a term known to, and understood by, those skilled in the art. Karypis Decl. ¶¶ 68-72. Thus, the act of performing a "non-exhaustive search" would be "readily understandable to one of ordinary skill in the art," and the patents "provide reasonable certainty as to the scope" of "non-exhaustive search." *Id*. Recently, the Federal Circuit held that a term that may appear to be purely subjective ("look and feel") is in fact definite and is not subjective when it has an established meaning in the art. *See DDR Holdings v. Hotels.com*, 2014 U.S. App. LEXIS 22902, *36-37 (Fed. Cir. Dec. 5, 2014). Professor Karypis's declaration about how "non-exhaustive search" was well known in the art establishes definiteness or, at a minimum, confirms the issue presents a genuine issue for trial. *Id*. at *37-38 (relying on trial testimony that the meaning of "look and feel" was "understood" to find the lower court properly denied motion for JMOL of indefiniteness); *see also Eidos Display, LLC v. AU Optronics Corp.*, __ F.3d __, Case No. 2014-1254, slip op. at 8-10 (Fed. Cir, Mar. 10, 2015) (reversing District

Court judgment of indefiniteness because a person of ordinary skill would have understood the claim limitation at issue).

(1) The Intrinsic Evidence Confirms Network-1's Construction Of "Non-Exhaustive Search"

The patents-in-suit explain the concept of "non-exhaustive search" in the specification. Col. 8:60-9:55; 21:7-22:37. The specification explains that an exhaustive search essentially requires comparing the query to every record in a data set to be searched until a match can be found, describing exhaustive searches as "a linear search of all N entries". Col. 9:24-25. On average, where a search could be halted after a match is found, this would require N/2 comparisons (where N is the number of records in the data set). *Id.* A non-exhaustive search, therefore, is one where the search query can be compared to fewer records in the data set, and need not be compared to every record until a match is identified.

The patents-in-suit provide several examples of non-exhaustive search methodologies in the specification. These methodologies include: clustering, kd-trees, vantage point trees, and excluded middle vantage point forests, as shown below. '988 patent 9:29-32.

Exemplar Non-Exhaustive Search Methods From The Specification	References From The Patent-In-Suit
binary search[7]	If binary search was possible, then a database containing N vectors would require at most log(N) comparisons.
clustering[8]	Clustering does not require comparing every record in a data set.[9]
kd-trees[10]	Kd-tree is a binary search tree that enables searching less

[7] Col. 9:19-22; 21:23-39.
[8] Col. 9:29-32; 21:13-17.
[9] The patents-in-suit incorporate by reference Duda and Hart for its extraction and matching techniques, and Fukunaga for its extraction technique. Both incorporated references provide further information on clustering. Exh. 8, R.O. Duda and P.E. Hart, *Pattern Classification and Scene Analysis,* at §7.1 (Wiley Interscience, New York, 1973) (incorporated by reference at Col. 7:37-40; 9:13-15) (distinguishing clustering from "exhaustive search rhough solution space" which by rerquiring the search of all records in a data set until a match is found "rapidly gets out of hand and is completely impractical for real-world problems."); Exh. 9, K. Fukunaga, Introduction to Statistical Pattern Recognition, 2nd Ed. at 502 & 524 (Academic Press, New York, 1990) (incorporated by reference at Col. 7:40-43) (differentiating clustering from exhaustive ensearch which will search all records in a record set until a match is found).
[10] Col. 22:6-10.

	than the full data set before not finding a match.[11]
vantage point trees[12]	Vantage point trees are a data structure that when searched does not require that all records in a data set be compared before finding no match to a query.[13]
excluded middle vantage point forests	Excluded middle vantage point forests like vantage point trees do not require that all records in a data set be compared prior to returning not match.[14]
approximate nearest neighbor search	Utilizing a search strategy to prune certain records that need not be searched.[15]

In each instance, the common feature of these types of searches is that they do not require searching all of the records in a data set until a match can be found. Karypis Decl., ¶¶57-58. One helpful way to consider the concept of a non-exhaustive search is in connection with a search that determines that no match is found in the reference data set. In an exhaustive search, all records in the data set would have to be compared to the query in order to make such a determination. *Id.* A non-exhaustive search can be capable of providing such a result without comparing the query to every record in the reference data set. *Id.*

(2) Network-1's Construction Conforms To The Understanding Of Those Skilled In The Art And The Extrinsic Evidence.

As Professor Karypis explains, non-exhaustive search is a term of art that was well understood by those skilled in art at the time of the invention of the patents-in-suit. Karypis Decl., ¶¶ 58-63; 69-72. The relevant contemporaneous art describes non-exhaustive searching

[11] Exh. 9, K. Fukunaga, Introduction to Statistical Pattern Recognition, 2nd Ed. at 361 (Academic Press, New York, 1990) (incorporated by reference at Col. 7:40-43).
[12] Col. 9:30.
[13] Exh. 10, N. Kumar, L. Zhang, and S. Nayar, "What is a Good Nearest Neighbors Algorithm for Finding Similar Patches in Images?"Proc. European Conf. Computer Vision (ECCV), pp. 364-378, 2008 (describing vantage poiunt trees as having "increasing speeds" over "larger datasets" as searching can be performed without looking at all records in a data set.).
[14] Exh. 11, P. N. Yianilos "Excluded Middle Vantage Point Forests for nearest Neighbor Search", Presented at the Sixth DIMACS Implementation Challenge: Near Neighbor Searches workshop, (Jan. 15, 1999) (incorporated by reference at Col. 9:32-35; 38-39).
[15] Exh. 12, P.N. Yianilos "Locally Lifting The Curse of Dimensionality For Nearest Neighbor Search" SODA 2000: 361-370 (incorporated by reference at Col. 9:35-39) (explaining that an "exhaustive" search does not allow any records to be "pruned" with confidence, while non exhaustive search can prune with confidence records to allow for a quicker and more efficient search: "Since δ scales up linearly with $\sqrt{d}$, the interval grows $[\pi_u(q) - \delta, \pi_u(q) + \delta]$ too, and soon the kd-tree can *confidently* prune almost nothing, and performs a nearly exhaustive search.").

consistent with its description in the specification as a search using an algorithm designed to locate a match without requiring the query to be compared to every record in the reference data set being searched until a match is identified. *Id.* ¶ 68. Various references reflect this understanding.

For example, the contemporaneous Denny reference explains that "non-exhaustive search strategies, such as the probabilistic algorithms studied in the previous chapter, traverse the search space more or less at random **and thus certain states may never be examined**."[16] Thus, this technical explanation would be understood by one skilled in the art that non-exhaustive searches are search methods that do not require a comparison to all records in a data set until a match is identified. Karypis Decl., ¶¶ 68-69. Similarly, other publications contemporaneous to the patents-in-suit (some of which are incorporated by reference in the patents and therefore intrinsic evidence) describe exhaustive search as a search that requires comparing all records in a data set until a match is found. These references are discussed in greater detail in the accompanying declaration of Professor Karypis. *See* Karypis Decl., ¶¶ 70-72. As one other example, a 1999 book entitled "Mastering Algorithms with PERL" explained that "the technique of generating and analyzing all of the states of a situation is called an exhaustive search. An exhaustive search is the generative analog of linear search – try everything until you succeed or run out of things to try." *See* Karypis Decl., ¶ 70; Exh. 14, *Mastering Algorithms with PERL*, (*Orwant, et al.*, O'Reilly Press, 1999, at 180).

This understanding is consistent with the way Google's own patents that reference exhaustive or non-exhaustive searches use these terms. *See, e.g.*, Exh. 15, U.S. Patent No. 8,136,025 (assigned to Google) at Col. 22:59-66 ("without incurring the cost of an exhaustive search through all records in the map"); *see also* Exh. 16, U.S. Patent No. 8,620,896 ("[t]his is

[16] Exh 13, Denny, P.C. (1988), *Search and Enumeration Techniques for Incidence Structures*, M.Sc. Thesis, Computer Science, University of Auckland at 5. (emphasis added).

often a non-exhaustive search, especially, should you forget to provide a name, phone number, or similar identifier."); Exh. 17. U.S. Patent No. 8,433,704 ("To do this, an **exhaustive search** may be performed over **all** 2^n T's . . .") (emphasis added).

(3) Google's Assertion Of Indefiniteness Cannot Be Supported.

As noted previously, Google bears a heavy burden to establish indefiniteness. Google cannot meet that burden here. As demonstrated above, "non-exhaustive search" is a term well-understood in the art and by persons skilled in the art. Karypis Decl., ¶ 72. Further, the patents-in-suit provide further clarity and explanation about that term, both in the claims and the specification. *Id.* As described above, the specification provides examples of non-exhaustive searches and explains the concept of a non-exhaustive search. Additionally, the specification and claims provide context to further clarify the meaning of the term. The claims recite performance of a non-exhaustive search for a neighbor or near neighbor throughout, and they further indicate that these searches are used to identify matches between a query compact electronic representation of an electronic work, and a collection of compact electronic representations of reference electronic works. *See, e.g.,* '179 patent, Claim 13. This provides additional context that further clarifies the meaning of "non-exhaustive search" and readily informs a person of skill in the art with reasonable certainty about the scope of the invention. Karypis Decl., ¶ 74.

Google's argument that this term is indefinite is also belied by Google's own patents, which repeatedly utilize the terms "exhaustive search" and "non-exhaustive search" as discussed in the preceding section. *See e.g.,* Exh. 16, U.S. Patent No. 8,620,896 ("[t]his is often a non-exhaustive search, especially, should you forget to provide a name, phone number, or similar identifier."); Exh. 17, U.S. Patent No. 8,433,704 ("To do this, an **exhaustive search** may be performed over **all** 2^n T's . . .") (emphasis added). Certainly Google would not use these terms in its own patents and patent filings if it were indefinite. Google's assertion of indefiniteness is a

new position developed solely for litigation, and inconsistent with its prior conduct and assertions.

(4) Google's Alternative Construction Does Not Comport With What One Skilled In The Art Would Understand "Non-Exhaustive Search" To Mean.

Google also proposes a construction should the Court correctly reject Google's assertions of indefiniteness. This "alternative construction" fails to adequately reflect either the nature of non-exhaustive search described in the intrinsic evidence, or the understanding of one skilled in the art generally. Google's definition focuses on the results of the search, rather than on the nature of the search, even though the claim term at issue is explicitly focused on the nature of the search. "Non-exhaustive" refers to the type of search methodology, not what results it will yield. Different types of search queries can seek and yield different types of results. For example, a search query seeking to identify multiple neighbors within a threshold distance of a query might yield 4 results. This fact alone, however, does not indicate whether the search to find those results was exhaustive or non-exhaustive. To know if the search was or was not exhaustive, one must examine more about the nature of how it was conducted – particularly whether the search algorithm used required comparison of the query to all of the records in the set to be searched or not. Karypis Decl., ¶¶ 73-74. Network-1's definition correctly focuses on the nature of the search, consistent with the claim language used, rather than on the results, which are not a sufficient basis to determine whether or not a search was non-exhaustive.

Binary searches are a simple example of non-exhaustive searches that are guaranteed to find a match. Karypis Decl., ¶¶ 64-67, 73-74; Col. 9:19-20. As Professor Karypis explains this type of search, while non-exhaustive, is only possible in certain contexts with certain kinds of data sets. *Id.* However, binary search is a non-exhaustive search guaranteed to find a match if one exists. *Id.* This fact alone confirms that Google's alternative definition is incorrect.

C) "non-exhaustive neighbor search"[17]

Plaintiff's Proposed Construction	Defendants' Proposed Construction
"A non-exhaustive search to identify a neighbor."	Indefinite. Alternatively, "A search that is not guaranteed to find a neighbor, if one exists."

The dispute relating to "non-exhaustive neighbor search" is nearly identical to the disputes of the terms "non-exhaustive search" and "neighbor" that are discussed above. See *supra* §§ IV(b), IV(c). For the reasons discussed above the proper construction of "non-exhaustive neighbor search" would be subject to construction of individual terms that are addressed elsewhere.

D) "associating" [an action with a work][18]

Plaintiff's Proposed Construction	Defendants' Proposed Construction
"Establishing a relationship between the action determined in the 'determining' step (d) and the first electronic work."	Indefinite

The only dispute regarding this term involves Google's assertion that the term is indefinite. Google does not offer any construction of its own. As shown below, however, Network-1's proposed construction is the correct interpretation of this clear term and Google cannot meet the high burden of demonstrating that this term is indefinite.

(1) "Associating" As Used In The Asserted Claims Has Definite, Clear Meaning.

As stated previously, "there is a heavy presumption that claim terms are to be given their ordinary and customary meaning." *Aventis Pharm. Inc.*, 715 F.3d at 1373. The term "associating" has a clear and ascertainable meaning to one of ordinary skill in the art in the context of the asserted claims. Karypis Decl., ¶ 76. The patent specification discusses the concept of associating an action with an electronic work (what is recited in the asserted claims) in various places. For example, at Column 6 (of the '988 patent specification), the patents describe creating an association between a particular electronic work and an action. Col. 6:34-

[17] Cited in '179 patent: **13**, 24, 34, 35; '441 patent: **1**, 2, 3, 9, 11, 22, **23**, **25**, **26** (bold indicates independent claim).
[18] Cited in claims '179 patent: **13**, 24, 34, 35; '441 patent: **1**, 2, 3, 9, 11, 22, 23, **25**, 26 (bold indicates independent claims).

60. In general, this discussion references the use of databases and the creation of associations between items or fields in a database, or multiple related databases. For example, the patents describe the ability to store a work identifier along with action records either as part of a single record in a database, or as separate records that can be accessed via a common "key" such as a particular identifier for a given work. *Id.* In general, the patents describe a process where a database of known works is created. Each known work might have a particular action associated with it. Such actions could include, for example, initiating an e-commerce transaction. *Id.* at Col. 9:65-10:1. When an unknown sample is analyzed, it may be identified as matching a known work in the database. The patent describes, in this circumstance, further associating the action associated with the original, reference, work with the newly-identified sample. Thus, the associated action is now tied to the newly-identified sample. *Id.* at 9:59-10:4. Using the example of initiating an e-commerce transaction, when an unknown sample (such as a newly uploaded video) is identified as matching a known reference (such as a popular television program), the system can associate an action for that reference (such as an offer to purchase a copy of the program) with the newly-identified sample so that viewers accessing that sample would be offered the opportunity to purchase the program. *See* Karypis Decl., ¶ 78.

The asserted claims that include the "associating" claim element all expressly do so in the same manner described above. Claim 13 of the '179 patent, for example, recites a process in which one or more databases are maintained that have both compact electronic representations of reference works, and data relating to an actions corresponding to those reference works (including such actions as displaying an advertisement). The method further involves obtaining a compact electronic representation of another work (an unknown) and using the system to identify it as matching one of the reference works. The system then determines the action that corresponds to the matched reference work and then creates an association between that action

and the (previously unknown) work so that the action will now be associated with that work as well. Creation of such associations is straightforward and easily understood. It could be achieved, for example, by copying the information regarding the action into the record for the previously unknown work. It could also be achieved by placing a link to the action information in the record for the previously unknown work. *See* Karypis Decl., ¶ 27.

The creation of associations and their use is discussed multiple times in the specification, all consistently with the use in the claims. '988 patent at 2:31-33 ("The computer then accesses a database, which is usually proprietary, and matches the ID with the associated web address."); *Id*. at 5:32-33 ("FIG. 9 is an exemplary data structure in which extra-work information is associated with a work identifier."); *Id*. at 6:38-40 ("Each item or record may associate a feature vector of a work with a, preferably unique, work identifier."); *Id*. at 6:46-50 ("Each item or record may associate a, preferably unique, work identifier with associated information.") *Id*. at 6:66-7:3 ("The extracted features, e.g., as a feature vector, can be used by a feature (vector) lookup operation(s) to search for a matching feature vector. If a match, or a match within a predetermined threshold is determined, then the associated work identifier is read."); *Id*. at 9:59-63 ("Assuming that the work is correctly identified, then the identifier can be used to retrieve associated information from the second work identification-action translation (WIDAT) database that contains information associated with the particular work."); *Id.* at 14:25-27 ("If a match, or a match within a pre- 30 determined threshold is determined, then the associated work identifier 516 is read."). *See* Karypis Decl., ¶ 77.

(2) This Claim Element Easily Meets The Standard For Definiteness

In *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S.Ct. 2120 (2014), the Supreme Court held that claim language is definite if it "inform[s] those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus*, 134 S.Ct. at 2129. While the Supreme Court rejected the precise wording of the Federal Circuit's existing test (whether a claim term was

"insolubly ambiguous"), the Court noted that, in its actual application, the new "reasonable certainty" standard may not differ significantly from the standard it replaced. The Court observed that the "Federal Circuit's fuller explications of the term 'insolubly ambiguous,' . . . may come closer to tracking the statutory prescription." *Id.* at 2130.

Importantly, the *Nautilus* Court did not hold that uncertainty about the scope of a claim or disagreements over definiteness pointed toward invalidity. In fact, the petitioners in *Nautilus* sought just such a ruling: "In Nautilus' view, a patent is invalid when a claim is 'ambiguous, such that readers could reasonably interpret the claim's scope differently.'" 134 S. Ct. at 2128. The *Nautilus* Court did not adopt such a standard. Instead, recognizing that "[s]ome modicum of uncertainty . . . is the 'price of ensuring the appropriate incentives for innovation,'" *id.*, the *Nautilus* Court held that the claim language must inform those skilled in the art with reasonable certainty—a formulation that allows for reasonable persons to disagree, but for one of them to be wrong. "The test for indefiniteness does not depend on a potential infringer's ability to ascertain the nature of its own accused product to determine infringement, but instead on whether the claim delineates to a skilled artisan the bounds of the invention." *See MeadWestVaco Corp. v. Rexam Beauty and Closures, Inc*., 731 F.3d 1258, 1270 n.9 (Fed. Cir. 2013) (quoting *SmithKline Beecham Corp. v. Apotex Corp.*, 403 F.3d 1331, 1340- 41 (Fed. Cir. 2005)). Even after *Nautilus*, "close questions of indefiniteness must be resolved in favor of the patentee." *In re: Maxim Integrated Prods., Inc*., Misc. No. 12-244, MDL 2354, 2014 U.S. Dist. LEXIS 100448, *48-49 (W.D. Pa. July 23, 2014) (citing *Bancorp Services, LLC v. Hartford Life Insurance Co*., 359 F.3d 1367, 1372 (Fed. Cir. 2004)).

Google has not explained why it contends that the "associating" claim elements are indefinite. The claim language is neither ambiguous nor subjective. "Associating" is a concrete action taken by a computer system. In these claims, it involves establishing a relationship

between the action (as determined in the determining step) and the (previously unknown) first electronic work. As explained by Professor Karypis, a person of skill in the art could readily understand the scope of the invention with reasonable certainty. Karypis Decl., ¶¶ 80-81.

In numerous other contexts, Google has admitted that it too understands what associating means. In petitioning for *Inter Partes* review of Network-1's patents, Google and its expert admitted that they could understand this claim language and its scope. Ex. 18. Google used the term "associate" or "associating" in the claims of more than 3,000 of its own patents and patent applications. *See* Berger Decl. Ex. 19; *see, e.g.*, Exh. 20, U.S. Patent App. 12/393,361 ("a computer-implemented method for ***associating an entity*** with a category includes determining a probability value") (emphasis added); Exh. 21, U.S. Patent No. 8,429,091 ("determining a type-specific association path between the first profile and a second profile by determining a number of ***associated profiles associating*** the first profile with the second profile based on a type;"); Exh. 22, U.S. Patent No. 8,064,736 ("***associating at least one of the one or more ideas*** with the graphical document based on the at least one identified image") (emphasis added). Presumably, if this term were so indefinite, Google would not have chosen to use it so prolifically in its own patents. Google's assertion of indefiniteness here is a disingenuous position taken for this litigation that conflicts with a mountain of prior conduct by Google.

E) "(f) obtaining, by the computer system, second extracted features of a second electronic work; (g) searching, by the computer system, for an identification of the second electronic work by comparing the second extracted features of the second electronic work with the first electronic data in the database using a non-exhaustive neighbor search; and (h) determining, by the computer system, that the second electronic work is not identified based on results of the searching step"[19]

Plaintiff's Proposed Construction	Defendants' Proposed Construction
These claim elements have their ordinary meaning, subject to construction of individual terms within them addressed elsewhere.	Indefinite

Google contends that somehow much of the structure of these claims is indefinite, but has

[19] Cited in '179 patent: **24**; '441 patent: **23**, **26** (bold indicates independent claim).

offered little explanation for this position. As described already, Google carries a heavy burden to establish indefiniteness. Google cannot meet that burden because the steps of these dependent claims are clear on their face (subject to the construction of individual included terms already discussed elsewhere). The limitations "obtaining, by a computer system," "searching, by the computer system" and "determining, by the computer system" do not require further elaboration. These claims recite simple additions to the process of claim 13 of the '179 patent and the systems of claims 1 and 25 of the '441 patent. In general, these dependent claims recite performing the same type of analysis of an unknown electronic work as described in the corresponding independent claims, and determining that the unknown electronic work is not a match to any of the reference works in the database. This is straightforward and readily understood by persons skilled in the art. *See* Karypis Decl., ¶ 82. Network-1 will further address this claim language should Google come forward with some explanation of the basis for its contention of indefiniteness.

VI. CONCLUSION

For the foregoing reasons, Network-1 requests that the Court adopt Network-1's proposed constructions, and find that Defendants have not proven that any of the claim terms at issue render any claims invalid for indefiniteness.

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CERTIFICATE OF SERVICE

The undersigned certifies that a true and correct copy of the foregoing document was filed electronically in compliance with Local Civil Rule 5.2 via the Court's CM/ECF system on March 27, 2015 and, as such, was served on the counsel of record.

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